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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,804	03/18/2004	Toshiharu Kinoshita	WATK:263	5101
6160	7590	04/07/2005	EXAMINER	
PARKHURST & WENDEL, L.L.P.			MAI, NGOCLAN THI	
1421 PRINCE STREET			ART UNIT	
SUITE 210			PAPER NUMBER	
ALEXANDRIA, VA 22314-2805			1742	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/802,804

Applicant(s)

KINOSHITA ET AL.

Examiner

Ngoclan T. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/9/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15, 17, 19, 21 is/are rejected.
- 7) ☒ Claim(s) 14, 16, 18, 20, 22-25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/9/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-6 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamagata et al. (US 6,737,168).

Yamagata et al. discloses composite material consists mainly of ceramic and semi-metal that is high in thermal conductivity and is obtained by infiltrating molten silicon into a porous body that is produced by sintering a highly pure SiC powder at a temperature between 1500 and 2300 C. See col. 3, lines 17-30 and col. 7, lines 28 to col. 8, line 31. Yamagata et al. teaches that it is desirable that the silicon carbide be present in the amount more than 50 wt.% or more so that thermal conductivity of 200 or 300 W/m.K can be obtained and less than 90 wt.%. col. 5, lines 37-57. Yamagata et al. teaches employing SiC of the 6H or 4H type for its superior thermal conductivity (as applied to claim 3), Col. 7, lines 12-15. Note that these types of SiC are well known as alpha SiC. In table 1, Yamagata et al. discloses the materials, sample No. 1-4 and 28-31 having the amount of Si and coefficient thermal conductivity as claimed. While Yamagata et al. does not specifically teach the bulk specific gravity of the material, the

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materials inherently have the claimed specific gravity since the materials employed in the method taught by Yamagata et al. contain the same amount of Si and SiC as claimed since the bulk specific gravity of the material is the combined specific gravity of the constituents in proportions that made up the material.

"Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established, In re Best, 195 USPQ 430, 433 (CCPA 1977). 'When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.' In re Spada, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best, 195 USPQ 430, 433 (CCPA 1977)."

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamagata et al in view of Kojima et al 5,589,116).

The difference between the claims and Yamagata et al is that Yamagata et al does not teach the presence of beta-silicon carbide and coefficient of thermal expansion of $3 \times 10^{-6}/K$ or less.

Kojima et al. disclose the claimed *beta* silicon carbide is conventionally known in the same field of endeavor for producing sintered silicon carbide body having high purity for use in the manufacturing semiconductor equipment, col. 1, lines 62-67. Kojima et al teaches that beta silicon carbide is high in purity and can be readily made by industry process.

Therefore it would have been obvious to also use the beta silicon carbide taught by Kojima et al as a part of the ceramic material in the composite taught by Yamagata et al. to provide high purity product. It is well settled that it is a matter of obviousness for one of ordinary skill in the art to combine two or more materials when each is taught by the prior art to be useful for the same purpose. In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

With regarding claims 9-11, Yamagata et al teaches the coefficient of thermal expansion for material having Si content of 9 to 25 % are between $3.7-3.9 \times 10^{-6}/K$. While the amounts are not overlapping that is claimed by the applicants, however it has been established that a prima facie case of obvious exists where the claimed ranges and the prior art ranges do not overlap but are closed enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 779 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985)

5. Claims 13, 15, 17, 19, 21, are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamagata et al in view JP2001019552.

Yamagata et al discloses the method for producing high thermal conductive material substantially as claimed. The difference between the claim and Yamagata et al

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is that Yamagata et al does not teach before impregnating the silicon carbide sintered body with molten Si, the sintered body is impregnated with organic resin following by drying and heat treating.

JP2001019552 teaches impregnating a molded product with an organic substance composed of one or more carbon source, drying the impregnated molded product and calcining the dried product before immersing the molded product in a high-purity metal silicon heated to 1450 –1700 C and melted so that silicon is sucked up in pores in the molded product by capillary is reacted with carbon generated from the organic substance and to fill the pores in the molding product with silicon carbide.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made that before impregnating the sintered silicon carbide body with molten silicon as taught by Yamagata et al, the sintered body be impregnated with organic resin to provide free carbon thereby facilitating infiltration of molten Si in the pores of the sintered body by capillary as taught by JP2001019552.

With regarding to claims 15 and 21, while Yamagata et al in view of JP2001019552 do not teach employing phenolic resin as the organic resin for impregnation, JP2001053203 teaches phenolic resin is conventionally known in the art to be used as a carbon source, see abstract. Thus the use of conventional materials to perform their known functions in a conventional process is obvious. In re Raner, 134 USPQ 343 (CCPA 1962).

Regarding claim 17, while Yamagata et al in view of JP2001019552 and further in view of JP 2001053203 does not teach the temperature at which the base material

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after impregnating with the resin is being heated, it would have been obvious to of ordinary skill in the art to heat the base to temperature at which resin is pyrolyzed to form carbon. Determination of an optimum or preferred temperature at which to conduct heating would have been obvious.


6. Claims 14, 16, 18, 20, 22-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. These claims contain subject matter that are allowable because while it is known to impregnating base material with organic resin, drying, heating the base to convert the resin to carbon and impregnating the base material containing carbon with molten silicon, there is no teaching, suggestion or motivation to further heating the silicon impregnated base material at the claimed temperature and further impregnating the heat treated material with silicon. Also while it is known to employ bimodal silicon carbide powder, see Alliegro et al, col. 2, lines 66-67, there is no teaching, suggestion or motivation to employ SiC powder having the particle size range and in the amount claimed by the applicants.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoclan T. Mai whose telephone number is (571) 272-1246. The examiner can normally be reached on 9:30-6:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Ngoclan T. Mai
Primary Examiner
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n.m.